

REMARKS

I. Introduction

In response to the Office Action dated February 19, 2002, claims 1-5 have been canceled without prejudice, and claims 6-12 have been added. Claims 6-12 are present in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested. It is not the applicant's intent to surrender any equivalents due to the amendments presented herein.

II. Drawing Objections and Specification Comments

On page 2 of the Office Action, the drawings were objected to because Figures 1-2 should contain a label of "Prior Art." The specification was cited as being checked for minor errors.

The Applicants thank the Examiner and will file substitute drawings for Figures 1-2 upon allowance of the application. The Applicants also thank the Examiner for checking the application, and the Applicants will check the application for minor errors as requested. Should the Applicants find any minor errors, the errors will be corrected in a future response.

III. Non-Art Based Rejections

On pages 2-3, the Office Action rejected claims 1-5 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

The Applicants thank the Examiner for the detailed instructions regarding the rejections and have canceled the claims which contained the rejected items. The Applicants have taken these rejections into account during the preparation of the newly added claims.

IV. Art-Based Rejections

On page 3, the Office Action rejected claims 1-5 under 35 U.S.C. § 102(b) as being anticipated by Figures 1-2 of Applicants' admitted prior art and Figure 1 of Fotouhi, (USPN 5,790,393).

On pages 3-4, the Office Action rejected claims 2 and 4-5 under 35 U.S.C. § 103(a) as being unpatentable over Figures 1-2 of Applicants' admitted prior art, specifically, controlling the power supply in saving mode.

The Applicants respectfully traverse the rejections in light of the amendments above and the arguments below. Specifically, the cited art does not teach nor suggest the limitation of generating the power supply clock using the system clock that is external to the charge pump type power supply.

A. The Fotouhi Reference

The Fotouhi Reference discloses a voltage multiplier that uses two non-overlapping clock signals generated by an external oscillator. The two clock signals operate the circuit in two phases. Both of the clock circuits are oscillators. See Col. 2, line 45 through col. 3, line 32.

B. Figures 1 and 2 of the Present Application

Figures 1 and 2 of the present application disclose an oscillator 35 used to drive switches SW1-SW4.

C. The Claims are Patentable over the Cited Art

Claims 6-12 recite display devices, drivers, and charge pump type power supplies. A charge pump type power supply circuit in accordance with the present invention comprises a first capacitor and a second capacitor, and a first switch and a second switch. The first switch connects a first terminal of the first capacitor to either of an input voltage or a first terminal of the second capacitor. The second

switch connects a second terminal of the first capacitor to either of a second terminal of the second capacitor or the input voltage.

The invention further comprises a control circuit that controls switching of the first switch to allow the first switch to alternatively connect the first terminal of the first capacitor to the input voltage or to the first terminal of the second capacitor, and further controls switching of the second switch to allow the second switch to alternatively connect the second terminal of the first capacitor to the input voltage or to the second terminal of the second capacitor. The control circuit, through the alternative connecting of the first and second switches, generates a boosted voltage at the first terminal of the second capacitor. The invention further comprises a power supply clock that is used to control the alternative connecting of the first and second switches to generate the boosted voltage, the power supply clock generated in accordance with a system clock, wherein the system clock is provided from outside of the charge pump type power supply circuit and is used for operation other than operating the power supply clock within the charge pump power supply circuit.

The cited art does not teach nor suggest using a system clock provided from outside of the charge pump type power supply used for operation other than operating the power supply clock, as claimed in the present invention.

The Fotouhi reference, and the related art disclosed in Figures 1 and 2 of the present application, show dedicated oscillatory circuits used for controlling the switches. There are no oscillators used for other purposes that drive the power supply clocks in either the Fotouhi reference or the related art Figures 1 and 2.

The present invention allows for the use of a pre-existing clock circuit, such as that used for a CPU or other clocking function outside of the power supply, to assist the power supply clock. Such function or functionality is not taught nor suggested in the cited references, and does not provide the added benefits shown in independent claims 6, 8, and 10 of the present invention.

Further, dependent claims 7, 9, and 11-12, in addition to containing the novel elements of independent claims 6, 8, and 10, recite additional novel elements and functions which further distinguish them from the cited references.

V. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

HOGAN & HARTSON L.L.P.

Date: August 19, 2002

By: 

John P. Scherlacher
Registration No. 23,009
Attorney for Applicant(s)

Biltmore Tower
500 South Grand Avenue, Suite 1900
Los Angeles, CA 90071
Telephone: (213) 337-6700
Facsimile: (213) 337-6701



APPENDIX A: CLAIMS IN MARKED-UP FORM

IN THE CLAIMS

Please cancel claims 1-5 and add claims 6-12 as follows:

1. (Unchanged) A charge pump type power supply circuit comprising:
a plurality of switches;
a plurality of capacitors, wherein
a supply voltage is generated by switch controlling said plurality of switches
and boosting the input voltage to a voltage of n times or $-n$ times the input voltage
based on a power supply clock produced by an integrated circuit using a
predetermined system clock, said integrated circuit being operated using said
system clock.
2. (Unchanged) A charge pump type power supply circuit according to
claim 1, wherein
said integrated circuit suspends the generation of said power supply clock in
response to a power save control instruction; and
said power supply circuit suspends the generation of said supply voltage in
response to the suspension of said power supply clock.
3. (Unchanged) A driving apparatus for a display device, comprising:
a driving circuit for generating a signal to allow a display section to display,
said driving circuit being operated using a predetermined system clock; and
a charge pump type power supply circuit for generating a supply voltage for a
display device by boosting the input voltage to a voltage n times or $-n$ times said
input voltage, said power supply circuit including a plurality of switches and a
plurality of capacitors, wherein

said driving circuit generates a power supply clock using said system clock;
and
said power supply circuit generates said supply voltage by switch controlling
said plurality of switches based on said power supply clock.

4. (Unchanged) A driving apparatus for a display device according to
claim 3, wherein,

said driving circuit suspends the generation of said power supply clock in
response to a power save control instruction; and

said power supply circuit suspends the generation of said supply voltage in
response to the suspension of the supply of said power supply clock.

5. (Unchanged) A display device having a display section and a driving
apparatus for driving the display section, wherein

said driving apparatus comprising:

a driving circuit for generating a signal to allow the display section to
display, said driving circuit being operated using a predetermined system clock; and

a charge pump type power supply circuit for generating a supply voltage for
said display device by boosting the input voltage to a voltage n times or $-n$ times the
input voltage, said charge pump type power supply circuit having a plurality of
switches and a plurality of capacitors, wherein

said driving circuit further generates a power supply clock using said system
clock and suspends the generation of said power supply clock based on a power save
control instruction; and

said power supply generates said supply voltage by switch controlling said
plurality of switches based on said power supply clock and suspends the generation
of said supply voltage in response to the suspension of the supply of said power
supply clock.

6. (New) A charge pump type power supply circuit comprising:
a first capacitor and a second capacitor;
a first switch, wherein the first switch connects a first terminal of the first capacitor to either of an input voltage or a first terminal of the second capacitor;
a second switch, wherein the second switch connects a second terminal of the first capacitor to either of a second terminal of the second capacitor or the input voltage;
a control circuit, wherein the control circuit controls switching of the first switch to allow the first switch to alternatively connect the first terminal of the first capacitor to the input voltage or to the first terminal of the second capacitor,
and further controls switching of the second switch to allow the second switch to alternatively connect the second terminal of the first capacitor to the input voltage or to the second terminal of the second capacitor,
the control circuit, through the alternative connecting of the first and second switches, generating a boosted voltage at the first terminal of the second capacitor;
a power supply clock, used to control the alternative connecting of the first and second switches to generate the boosted voltage, the power supply clock generated in accordance with a system clock, wherein
the system clock is provided from outside of the charge pump type power supply circuit and is used for operation other than operating the power supply clock within the charge pump power supply circuit.

7. (New) A charge pump type power supply circuit according to claim 6, wherein
said control circuit suspends the generation of said power supply clock in response to a power save control instruction; and

said control circuit suspends the generation of said boosted voltage in response to the suspension of said power supply clock.

8. (New) A driving apparatus for a display device, comprising:

a driving circuit for generating a signal to allow a display section to display, said driving circuit being operated using a predetermined system clock external to the driving apparatus; and

a charge pump type power supply circuit for generating a supply voltage for a display device by boosting ~~the~~ input voltage to a voltage n times or $-n$ times said input voltage, said power supply circuit including a plurality of switches and a plurality of capacitors, wherein

said driving circuit, generates a power supply clock internal to the charge pump type power supply circuit using said system clock; and

said power supply circuit generates said supply voltage by switch controlling said plurality of switches based on said power supply clock.

9. (New) A driving apparatus for a display device according to claim 8, wherein,

said driving circuit suspends the generation of said power supply clock in response to a power save control instruction; and

said power supply circuit suspends the generation of said supply voltage in response to the suspension of the supply of said power supply clock.

10. (New) A display device having a display section and a driving apparatus for driving the display section, wherein,

said driving apparatus comprising:

a driving circuit for generating a signal to allow the display section to display, said driving circuit being operated using a predetermined system clock external to the driving circuit; and

a charge pump type power supply circuit for generating a supply voltage for said display device by boosting the input voltage to a voltage n times or $-n$ times the input voltage, said charge pump type power supply circuit having a plurality of switches and a plurality of capacitors, wherein

said driving circuit further generates a power supply clock, the power supply clock being internal to the driving circuit, using said system clock, and suspends the generation of said power supply clock based on a power save control instruction; and

said power supply generates said supply voltage by switch controlling said plurality of switches based on said power supply clock and suspends the generation of said supply voltage in response to the suspension of the supply of said power supply clock.

11. (New) The display device of claim 10, wherein the charge pump type power supply circuit and the driving circuit are provided in a semiconductor device and the plurality of capacitors are external to and connected to the semiconductor device as outer elements.

12. (New) The display device of claim 10, comprising at least two charge pump type power supply circuits; wherein the driving circuit generates a separate power supply clock for each of the charge pump power supply circuits, and each power supply clock is suspended independently from the other power supply clocks based on the power save control instruction.